## NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

## DIVISION OF HIGHWAYS GEOTECHNICAL UNIT

## SUBSURFACE INVESTIGATION

	SOIL AND ROCK LEGI	GEND, TERMS, SYMBO	LS, AND ABBREVI	ATIONS	
SOIL DESCRIPTION	GRADATION			DESCRIPTION	TERMS AND DEFINITIONS
SDIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED OR WEATHERED EARTH MATERIALS	WELL GRADED- INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO CO- UNIFORM- INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO			T WHEN TESTED, WOULD YIELD SPT REFUSAL AN INFERRED COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL.	ALLUVIUM (ALLUV.) - SOILS WHICH HAVE BEEN TRANSPORTED BY WATER.
WHICH CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND WHICH YIELDS LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL	POORLY GRADED) GAP-GRADED- INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.	SPT REFUSAL	. IS PENETRATION BY A SPLIT SPOON	SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. ON BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE	ADUIFER - A WATER BEARING FORMATION OR STRATA.
CLASSIFICATION IS BASED ON THE AASHTO SYSTEM AND BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH	ANGULARITY OF GRAINS	OF WEATHERE	D ROCK. ALS ARE TYPICALLY DIVIDED AS FOL	•	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE:	THE ANGULARITY OR ROUNDNESS OF 901L GRAINS ARE DESIGNATED BY THE TERMS; ANGULAR SUBANGULAR, SUBROUNDED, OR ROUNDED.	JLAR. WEATHERED	555	LAIN MATERIAL THAT YIELDS SPT N VALUES > 100 BLOWS	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC.
VERY STAFF, GAM SLEY CLAY, MOST WITH INTERSECTION FAME SAND LIGHES, MICHAEL PLASTIC, A-7-6  SOIL LEGEND AND AASHTO CLASSIFICATION	MINERALOGICAL COMPOSITION	ROCK (WR)	PER FOOT.		ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IS IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS ORGANIC MATERIALS	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIP	RIPTIONS CRYSTALLINE ROCK (CR)	WOULD YIELD SI السير إ	E GRAIN IGNEOUS AND METAMORPHIC ROCK THAT PT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE,	GROUND SURFACE.
CLASS. (35% PASSING *200) (35% PASSING *200)	WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.		GNEISS, GABBRO,	SCHIST, ETC. GRAIN METAMORPHIC AND NON-COASTAL PLAIN	CALCAREOUS (CALC.) - SOILS WHICH CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5 CLASS. A-1-a A-1-b A-2-4 A-2-5 A-2-6 A-2-7 A-4, A-5 A-6, A-7	COMPRESSIBILITY  SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 30	NON-CRYSTALLIN ROCK (NCR)	SEDIMENTARY R	OCK THAT WOULD YEILD SPT REFUSAL IF TESTED. ROCK TYPE	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.
SYMBOL BOSSESSESSESSESSESSESSESSESSESSESSESSESSE	MODERATELY COMPRESSIBLE LIQUID LIMIT 31-50 HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 9	COASTAL PLAIN	OCK COASTAL PLAIN	SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD BOCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
X PASSING SILT- MUCK, GRANULAR SILT- MUCK,	PERCENTAGE OF MATERIAL  GRANULAR SILT- CLAY	· · · · · · · · · · · · · · · · · · ·	SHELL BEDS, ET	ATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT
* 40 30 MX58 MX51 MN SOILS SOILS SOILS SOILS SOILS	ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL  TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 16	FRESH R	OCK FRESH, CRYSTALS BRIGHT, FEW J	DINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER	ROCKS OR CUTS MASSIVE ROCK.  DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE
LIGHT 40 MX41 MN 48 MX41 MN 48 MX41 MN 48 MX41 MN SOILS WITH	LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 2  MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 3	- 20% - 35% VERY SLIGHT R		ED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF	HORIZONTAL.  DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF
PLASTIC INDEX 6 MX N.P. 10 MX 10 MX 11 MN 11 MN 10 MX 10 MX 10 MX 11 MN 11 MN LITTLE OR HIGHLY GROUP INDEX 0 0 0 4 MX 8 MX 12 MX 16 MX No MX MODERATE ORGANIC	HIGHLY ORGANIC >10% >20% HIGHLY 35% AI  GROUND WATER		F A CRYSTALLINE NATURE.	CE SHINE BRIGHTLE ROCK RINGS UNDER HAMMER BLOWS IF	THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
USUAL TYPES STONE FRAGS. FINE SILTY OR CLAYEY SILTY CLAYEY ORGANIC	WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING.	(SL1.) 1	INCH. OPEN JOINTS MAY CONTAIN CL	NED AND DISCOLORATION EXTENDS INTO ROCK UP TO AY, IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.  FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
MATERIALS SAND SAND GRAVEL AND SAND SUILS SUILS	STATIC WATER LEVEL AFTER 24 HOURS.	MODERATE S	IGNIFICANT PORTIONS OF ROCK SHOW	CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS. DISCOLORATION AND WEATHERING EFFECTS. IN	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM
GEN.RATING AS A EXCELLENT TO GOOD FAIR TO POOR FAIR TO POOR POOR UNSUITABLE SUBGRADE	PERCHED WATER, SATURATED ZONE OR WATER BEARING STRATA	D D		RE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS ID SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED	PARENT MATERIAL.  FLOOD PLAIN (F.P.) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY
P.I. OF A-7-5 ≤ L.L 30 : P.I. OF A-7-6 > L.L 30	SPRING OR SEEPAGE	•		OR STAINED, IN GRANITOID ROCKS, ALL FELDSPARS DULL	THE STREAM.
CONSISTENCY OR DENSENESS    RANGE OF STANDARD   RANGE OF UNCONFINED	MISCELLANEOUS SYMBOLS			OW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH DGIST'S PICK. ROCK GIVES 'CLUNK' SOUND WHEN STRUCK.	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.
PRIMARY SOIL TYPE COMPACTIONS OF PENETRATION RESISTENCE COMPRESSIVE STRENGTH		AMPLE #	F TESTED, WOULD YIELD SPT REFUSAL	, and the state of	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
GENERALLY VERY LOOSE <4	AUSED POSTAGE	(SEV.) II	N STRENGTH TO STRONG SOIL. IN GR	ED OR STAINED ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED ANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO
GRANULAR LOOSE 4 TO 10 N/A MATERIAL MEDIUM DENSE 10 TO 30 N/A	ARTIFICIAL FILL OTHER THAN ASSESSED SS- SPLIT	-	XTENT. SOME FRAGMENTS OF STRONG F TESTED, YIELDS SPT N VALUES > 1		LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
(NON-COHESIVE) DENSE 30 TO 50 VERY DENSE >50	ST- SHELL			O OR STAINED, ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
VERY SOFT	INFERRED SOIL BOUNDARIES MONITORING WELL SAMP	AMPLE R	EMAINING. SAPROLITE IS AN EXAMPLE	DF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR RIC REMAIN. IF TESTED, YIELDS SPT N VALUES < 100 BPF	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.
SILT-CLAY MEDIUM STIFF 4 TO 8 0.5 TO 1	PIEZOMETER	COMPLETE R		NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND	RESIDUAL SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
MATERIAL STIFF 8 TO 15 1 TO 2 (COHESIVE) VERY STIFF 15 TO 30 2 TO 4		ECOMPACTED SO		MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS	ROCK QUALITY DESIGNATION (R.Q.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY: TOTAL LENGTH OF
HARD >30 >4		CBR SAMPLE		HARDNESS	ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AN EXPRESSED AS A PERCENTAGE.
TEXTURE OR GRAIN SIZE	SPT N-VALUE	VERY HARD		SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES	SAPROLITE (SAP.) - RESIDUAL SOIL WHICH RETAINS THE RELIC STRUCTURE OR FABRIC OF THE
U.S. STD. SIEVE SIZE 4 10 40 60 200 270 OPENING (MM) 4.76 2.0 0.42 0.25 0.075 0.053	• - SOUNDING ROD REF— SPT REFUSAL		SEVERAL HARD BLOWS OF THE GEOLO	GISTS PICK.	PARENT ROCK.  SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND
POULDED CORRE GRAVEL COARSE FINE SILT CLAY	ABBREVIATIONS  AR - AUGER REFUSAL PMT - PRESSUREMETER TEST		TO DETACH HAND SPECIMEN.	K ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED	TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS
GRAIN   MM 305 75   2.0   0.25   0.05   0.00	BT - BORING TERMINATED SD SAND, SANDY CL CLAY SL SILT, SILTY	HARD		K. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE LOGISTS PICK. HAND SPECIMENS CAN BE DETACHED	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.
SIZE IN. 12* 3*	CPT - CONE PENETRATION TEST SLI SLIGHTLY CSE COARSE TCR - TRICONE REFUSAL	MEDIUM	CAN BE GROOVED OR GOUGED 0.05 IN	CHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.	STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR B.P.F.) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH
SOIL MOISTURE - CORRELATION OF TERMS	DMT - DILATOMETER TEST 7 - UNIT WEIGHT		CAN BE EXCAVATED IN SMALL CHIPS POINT OF A GEOLOGISTS PICK.	TO PEICES I INCH MAXIMUM SIZE BY HARD BLOWS OF THE	A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER, SPT REFUSAL IS LESS THAN 0.1 FOOT PENETRATION
SOIL MOISTURE SCALE FIELD MOISTURE GUIDE FOR FIELD MOISTURE DESCRIPTION  SOIL MOISTURE SCALE FIELD MOISTURE DESCRIPTION	e - VOID RATIO  F FINE  W - MOISTURE CONTENT			BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL. THIN	WITH 60 BLOWS.  STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY	FOSS FOSSILIFEROUS V VERY FRAC FRACTURED VST - VANE SHEAR TEST	!	PIECES CAN BE BROKEN BY FINGER F	RESSURE.	DF STRATUM AND EXPRESSED AS A PERCENTAGE.  STRATA ROCK QUALITY DESIGNATION (S.R.Q.Q.) - A MEASURE OF ROCK QUALITY DESCRIBED BY:
LL LIOUID LIMIT (SAT.) FROM BELOW THE GROUND WATER TABLE	FRAGS FRAGMENTS	SOFT	OR MORE IN THICKNESS CAN BE BROK	EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH EN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY	TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 10 CENTIMETERS DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
PLASTIC   SEMISOLID; REDUIRES DRYING TO	EQUIPMENT USED ON SUBJECT PROJECT		FINGERNAIL. ACTURE SPACING	l BEDDING	TOPSOIL (T.S.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
(P) PLASTIC LIMIT ATTAIN OPTIMUM MOISTURE			SPACING	TERM THICKNESS	BENCH MARK: BL-3, 18.73' LT OF -L- STA 18+08.47
OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE	DRILL DRITS: ADTACTIO TOOLS!	MATIC MANIAI VERY WIDE	MORE THAN 10 FEET	VERY THICKLY BEDDED > 4 FEET THICKLY BEDDED 1.5 - 4 FEET	
SL SHRINKAGE LIMIT	MOBILE B-47	WIDE MODERATELY		THINLY BEDDED 0.16 - 1.5 FEET VERY THINLY BEDDED 0.03 - 0.16 FEET	ELEVATION: 55.24'
REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	6 CONTINUOUS FLIGHT AUGER CORE SIZE:	VEDV CLOCK	0.16 TO 1 FEET LESS THAN 0.16 FEET	THICKLY LAMINATED 0.008 - 0.03 FEET	NOTES:
ALLMAN OF THOS FOLESTONE	The Hollow Hollis			THINLY LAMINATED < 0.008 FEET URATION	
PLASTICITY  PLASTICITY INDEX (PI) DRY STRENGTH	- CME-45C HARD FACED FINGER BITS -N	FOR SEDIMENTAF		ING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	
NONPLASTIC 0-5 VERY LOW	TUNGCARBIDE INSERTS	FRIAL		WITH FINGER FREES NUMEROUS GRAINS;	
LOW PLASTICITY         6-15         SLIGHT           MED. PLASTICITY         16-25         MEDIUM	CASING W/ ADVANCER HAND TOOLS	DLS:	GENTLE	BLOW BY HAMMER DISINTEGRATES SAMPLE.	
HIGH PLASTICITY 26 OR MORE HIGH		i		CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; EASILY WHEN HIT WITH HAMMER.	·
COLOR	OTHER CONTROL	ID AUGER UNDING ROD INDUR		ARE DIFFICULT TO SEPARATE WITH STEEL PROBE:	
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YEL-BRN, BLUE-GRAY)	I LUNE BIT	NE SHEAR TEST	DIFFICU	LT TO BREAK WITH HAMMER.	
MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.	OTHER OTHER OTHER	EVTOR		HAMMER BLOWS REQUIRED TO BREAK SAMPLE; BREAKS ACROSS GRAINS.	

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STATE PROJECT NO. SHEET NO. TOTAL SHEETS
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